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UNITED STATES DEPARTMENT OF AGRICULTURE

FOREST SERVICE

# BRANCH OF RESEARCH

# MONTHLY REPORT

OF

FOREST EXPERIMENT STATIONS
FOREST PRODUCTS
FOREST ECONOMICS
RANGE RESEARCH

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BRANCH OF RESEARCH

February 1932.

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## "SKILL IN COMMUNICATIONS WITH OTHERS"

Owen D. Young, among other things head of the General Electric Company and an engineer, wrote to the President of Haverford College some time ago a list of five objectives for an American college, based on his experience with the young man in search of a job. College, he said, should assist the student ---

1. To develop character.
2. To stimulate the student's intuitions and emotions.
3. To discover his mental aptitude and train it.
4. To learn enough about our organized machinery of society to apply his gifts effectively.
5. To acquire skill in communications with others. That means languages, both oral and written, and manners, too.

Of this fifth item, he held that it "must be a suitable carrier for the kind of load which is to be put upon it; that is to say, if the man operates in the field of science, clearness and accuracy are essential. If in the field of politics or literature, style must be added."

On a subsequent occasion addressing the graduating class of St. Lawrence University, Mr. Young said:

"I have discovered, after a long experience, that misunderstandings arise between men largely because of the failure of adequate expression. Our great engineers as a rule do not know how to tell what they have in mind. They have splendid plans but they do not know how to present them to the public.

"Have you acquired adequate skill in communication with others? At best, one can communicate to others not more than 5 per cent of what he thinks or sees or feels. Language is inadequate. All languages are inadequate, no matter how many of them you may know or how skillfully you may use them. Language, however, is the principal conveyer of understanding, and so we must learn to use it, not crudely, but discriminately. Be careful that your language is clear and that words are accurately used. Sentences must be short. Then add style if you can."

Much more than this might be said of the requirements for good scientific writing, but the order of importance indicated in the last three sentences seems especially worthy of emphasis - first, accuracy of statement; second, conciseness and clarity; third, style, if any. But back of these is the implication of a requirement of far greater importance, namely, some understanding of the need for "skill in communications with others." C.F.H.

(Over)

## ALLEGHENY FOREST EXPERIMENT STATION

### General

The best meeting which the Advisory Council has yet held took place at Atlantic City on January 29 and 30. Nine members of the Council were present, and reports on current forest research were heard from the following agencies, in addition to the Station: The Armstrong Forest Company, Pennsylvania State College, and the State Forestry Departments of Maryland, New Jersey, and Delaware. The Council went on record as believing that the program of the Station in forest pathology covered too wide a field, and that there should be greater concentration on the study of oak sprout rot. Chairman Lipman suggested that the Council should interest itself in such broad movements as the promotion of regional conferences on land utilization.

The Station has been considering the abandonment of the Camp Ockanickon Branch Station, in favor of a location on the Lebanon State Forest. A move to the State Forest should give us a more satisfactory tenure of our experimental areas than we now have.

The Pennsylvania Forestry Association has become greatly interested in the preservation for scientific purposes of a portion of the virgin timber on East Tionesta Creek. It has appointed an enthusiastic committee to obtain an option from the Central Pennsylvania Lumber Company, owner of the tract, and will endeavor to raise funds for the purchase of an area and its eventual presentation to the Forest Service. It hopes to raise the necessary funds for the purchase among scientific foundations and philanthropic individuals interested in forestry.

The Station is giving a trial to staff meetings held jointly with the botany faculty of the University of Pennsylvania. Although we can not expect any very large attendance from the faculty, such joint meetings will have the advantage of keeping the U. of P. faculty informed as to our projects and general methods of work. At the first meeting of this kind Mr. Jackson described his work in the pathological field.

Messrs. Duthie and Kylie of the Branch of Public Relations visited the Camp Ockanickon Branch, and this visit constitutes the first contact of the Branch of Public Relations with any experimental work in our territory.

### Management

Allegheny hardwoods. In his continued analysis of the data on the East Tionesta virgin area Hough has been constructing phytographs, similiar to those which Lutz used in his article on Hearts Content, and has been putting in graphic form a large part of the accumulated data.

Mycorrhiza

Hatch assisted Doak in his histological work with the materials obtained in the 1931 field survey. Late in January he returned to the Boyce Thompson Institute at Yonkers, where, with an improved technic, he set up his pure culture apparatuses for studying the physiology of the mycorrhizal associations. He now has about 85 seedlings of loblolly pine growing in 16 sterile chambers, through which air is being forced, and which will be supplied with nutrient solutions carefully controlled as to the carbon-nitrogen ratio. Provision was made for pushing to completion the histological work on the mycorrhiza collections made during the field survey of 1931, and for Hatch's completion of his two experiments begun in Sweden. Doak plans to revisit certain specified localities, including the Branch Stations, at intervals during the field season in order to obtain data on the development and longevity of the mycorrhizal fungi. He will begin experiments of his own in the greenhouse at Philadelphia on the synthesis of fungi and three or four species of native tree seedlings.

Measurements

Schnur has completed a cubic foot volume table for loblolly pine, necessary to further work on the old sample plot data. Twelve plots, for which he has five measurements, show a striking tendency toward normality when number of trees is plotted over average d.b.h. Three under-stocked plots, however, show an early tendency to progress toward normality in this respect, but then cease to make any progress. This is taken to indicate that the understocking is due to holes, rather than a uniform wide spacing. In general the increments shown by the permanent yield plots follow pretty close to the increments indicated by yield tables for this species.

Forest Pathology

Jackson is well along on his manuscript covering the effect of H-ion and Al-ion concentrations on damping-off diseases and the root system of young tree seedlings.

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APPALACHIAN FOREST EXPERIMENT STATION

Management

Although six major forest types occur in Sosebee Cove the primary interest is in the 4.5 acres of pure even-aged poplar. Final computations

show this stand to contain 23,295 board feet per acre in trees of the twelve inch diameter class and larger. As the stand is 58 years old the average annual growth has been approximately 402 board feet per acre. (Scribner decimal C). Analysis of increment borings shows some reduction in current growth rate, although this reduction is not as great as might be expected if the density of the stand and its age are considered. Of the diameter growth made during the last 20 years, 44 per cent was made in the decade 1922-1931, and 56 per cent during the period 1912-1921.

Barrett and Buell measured the cordwood cut on the woodlands of the Georgia Mountain Experiment Station. Prior to cutting, the marked stand had been carefully tallied and the total proposed cut computed in merchantable cubic feet. A total of 58 standard cords (4 x 4 x 8) was cut from 18 acres, approximately 3.2 cords per acre. The ratio between computed merchantable cubic feet and stacked cords was found to be 85.5 cubic feet per cord.

On the Biltmore Estate, part of a 23-year-old white pine plantation was cut to release land for agriculture. Most of the wood down to a 4 inch d.i.b. top was peeled for pulpwood, while a large part of the remainder was worked up into fuelwood. This cutting provided an opportunity to obtain stem measurements for preparing a volume table. A number of trees were taken in each diameter class from 3 to 9 inches, with heights ranging from 33 to 53 feet. Data were gathered on spacing and the relative distribution of trees among diameter classes.

## Forestation

An inspection of test plantings of Japanese red pine (P. densiflora) and Norway pine (P. resinosa) put in last spring at Bent Creek showed a much higher survival for the Japanese than for the Norway pine. In spite of a rather dry summer 85 per cent of the Japanese red pines survived, while only 55 per cent of the Norways pulled through.

## Biology (Biological Survey)

Results from a series of burned and unburned sample plots on Rocky Knob near Asheville, show that the rodent population of the burned area is not materially lower than that of the unburned woods, although it is not clear from the data whether the population found on the burn survived the fire or migrated in. The area under observation was burned in November, 1931. Three pairs of one-fourth acre sample plots were used in the study. The conditions represented were: (1) recently cut hardwoods, with slash covering the ground; (2) open hardwoods; and (3) hardwoods with a dense understory of laurel and rhododendron. For each of these conditions a burned and unburned plot was established. Each plot was trapped intensively for a period of two weeks.

The total catch of rodents on the check (unburned) plots varied from 21 in the open hardwoods to 15 in the hardwoods-laurel type.

These figures indicate a population of 60 to 84 rodents per acre, a surprising number in view of the small populations noted previously, at Bent Creek.

The population found on the burned plots was even more surprising. The fire was severe, in places burning all duff and humus to the mineral soil and removing practically all food and a considerable part of the protecting brush and slash. And yet 11 mice were trapped on one of the burned plots and a number of traps disappeared during the night. It is likely that the traps which disappeared contained mice and were carried off by shrews or predators. The indicated population, therefore, is practically as high as on the check areas.

Many of the mice taken during the study were immature, showing that breeding has continued throughout the mild winter.

Fire Studies

Word reached the station about the middle of the month that an accidental fire had burned over the check plots of the annual burning experiment at Lanes, South Carolina.

The fire, burning over 1,200 acres in 7 hours, did not reach the plots until 10 p.m. Even at that time with the rapidly increasing humidity the check area containing 6 longleaf pine plots was burned severely. The crowns of most of the trees were completely defoliated and the bark charred to lengths of 15 feet. On the 18 acre area which has been burned annually for 3 years the fire caused relatively little defoliation and no charring of bark above 6 feet.

Heights and diameters of all trees on all plots were measured. The diameters outside bark of the trees on the burned over check plots were, in many cases, smaller than 3 years ago.

Accordingly, bark thickness measurements were taken on many of the plots. These measurements have not been analyzed, but observation in the field indicated a material reduction in bark thickness due to the fire. In this work the Swedish bark measuring instrument was used. Insertion by hand proved to be quite time consuming and hard on the hands so small wooden mallets with leather covered faces were used and found satisfactory. It was also found for a small sample of trees on an annually burned plot that the bark thickness on the south side of the trees was consistently greater than the average of four measurements taken in the cardinal directions and the north bark thickness was significantly smaller than the mean. Further analysis of the data will assist materially in determining the satisfactory number and position of bark thickness measurements on individual trees.

A new two-acre check plot was established on an unburned tract contiguous to the annually burned area. This has remained unburned for 12 years, but its future is questionable because of the conditions of ownership. The density of stocking also varies considerably on the new plot, but the data were taken by 1/40-acre blocks so that they can be combined to give larger plots having desired densities of stocking.

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## CALIFORNIA FOREST EXPERIMENT STATION

### General

One of the activities on which Director Kotok spent some time during the month was the annual Forest Supervisors' meeting of the California Region. This afforded a real opportunity for getting field administrative men better acquainted with different lines of Station research work, especially that in fire.

### Forest Management - Pine Region

Before Reineke's departure for the Northeastern Station, he completed three Station manuscripts for review preparatory to publication. These are "Principles of quadrat sampling in silvical studies," "A stand-density index for even-aged forests," and "Preliminary yield tables for second-growth mixed - conifer types in California."

Progress reports for the two methods of cutting plots on the Shasta were completed by Hasel. Growth has been disappointingly slow on those plots. Net growth on the 25-acre plot has averaged 12.4 cubic feet per acre annually since 1911, or a growth rate of 0.49 per cent (simple interest) on 2,548 cubic feet. In this, however, were absorbed losses averaging 11.2 cubic feet per acre annually. Slightly better net growth was shown on the 11-acre plot, chiefly as a result of lighter losses. These acres are classed as low Site III. Volume composition, based on trees 3.6 inches diameter and over, averaged about 68 per cent ponderosa pine, 18 per cent incense cedar, 9 per cent Douglas fir, 4 per cent white fir, and 1 per cent sugar pine. Composition has not changed appreciably since the plots were established in 1911. Attempts made to favor the pines in marking by leaving some of the large mature trees for seed production have not materialized. Nearly all the reproduction established since logging is incense cedar.

Person and Gibbs have completed the analysis of the planting data taken on the 79 tenth-acre plots used in the study of planted areas and have recorded the results by means of table and graphs. As was expected the interval between logging and planting shows a definite relation to survival of planted trees. Trees planted within one year of logging showed about twice the survival of trees planted two or more years after logging and trees on areas logged 2-3 years before planting showed an average survival of nearly two times that of trees planted on areas logged six or more years before planting.

Another factor which has an important effect upon survival is class of stock. Most of the redwood stock planted was either 1-0 or 1-1 and a comparison of the average survival of these two classes shows that the 1-1 stock is decidedly superior both as to survival and growth. The average survival percentage of 1-1 redwood stock, for example, was more than twice that for 1-0 stock. These results are shown in the following table:

Redwood Planting Survival

| Interval between logging and planting Yrs. | 1-0 Stock No. of plots | 1-0 Stock Avg. % Surv. | 1-1 Stock No. of plots | 1-1 Stock Avg. % Surv. | Avg. 1-0 and 1-1 No. of plots | Avg. 1-0 and 1-1 Avg. % Surv. |
|---|---|---|---|---|---|---|
| 0-1 | 6 | 47.2 | 26 | 61.0 | 32 | 58.4 |
| 2-3 | 7 | 29.4 | | | 7 | 29.4 |
| 4-5 | 5 | 20.8 | | | 5 | 20.8 |
| 6+ | 13 | 15.4 | 5 | 16.8 | 18 | 15.8 |
| All (Wtd.) | 31 | 25.6 | 31 | 53.8 | 62 | 39.7 |

Obviously these results cannot be taken as accurate numerical measures of difference, due to the absence of 1-1 plots in the intermediate interval classes; to too wide periods of logging, sometimes covering 3 years for a single plot, and thus making it possible for the interval classification of a plot to vary according to interpretation; and to company differences in planting practice and efficiency, as well as to exposure, site and weather by years, none of which are here taken account of. But it seems clear that they do represent fairly definite major trends.

As to height growth, it was found that in trees planted one year there was an average difference of three inches in favor of the 1-1 stock, and in trees planted six years there was an average difference of 15 inches in favor of 1-1 stock. Of the surviving trees those from 1-1 stock were also more vigorous than those from 1-0 stock.

## Forestation

The Feather River Nursery is snowbound, and no shipment of stock for spring planting will be possible before April first. This report is consistent with snow conditions throughout the Sierra Nevada at this time, and since we still have a reasonable expectancy of additional precipitation during March and April the stage is all set for a record snow pack in the mountains. The probable delay to planting operations will be more than compensated by the additional moisture. In a conference with Assistant Regional Forester Woodbury and C. W. Corson, in charge of Susanville Nursery, Kraebel planned closer cooperation with the administrative organization in planting problems.

Southern California has also shared in the unusual weather and Weaver's report establishes two records for the six years of observation at Devil Canyon Nursery: "Precipitation for the month (February) has been 12.16 inches at the nursery gage and higher at other gages; 16 inches of snow fell on the sixteenth, of which 9 inches fell between 8 a.m. and 1 p.m. that day. Precipitation for the season to date is 33 inches."

The stormy weather caused postponement of midwinter seedbed operations but shipment of planting stock to the southern forests and cooperators went forward on schedule. Approximately half of the available stock was shipped by the end of the month.

## Erosion and Streamflow

### Heavy Storms in February

Continued heavy storms in February brought about 12 inches of precipitation at Devil Canyon (20 inches for January and February, or about as much as in an ordinary year) and brought both rain and snow. Unusual depths of snow confronted Sinclair, who was responsible for installations in southern California, with some interesting problems in accuracy of measurements. The location of rain gages over a watershed so that they may accurately indicate the total catch of rain, is still not sufficiently worked out. Steep topography increases the difficulty in locating rain gages properly. If has become apparent that points and ridges, such as might be selected for triangulation stations,are unsuited for rain gage locations. Accordingly it is proposed to work out a system of relocation of gages and a method to test the adequacy of numbers necessary, within certain plus and minus variations. This matter becomes of first importance in calculating run-off coefficients from watersheds.

Snow presents additional problems in measurement. On small watersheds the snow course appears less applicable than on large areas. Loss

of snow by evaporation also requires determination. Thus this year of heavy precipitation, much of which has come in the form of snow, has called attention to phases of our problem which must be included even for southern California regions.

The Lost Creek (Plumas National Forest) Reservoir profiles are practically completed by Rowe. Resurveys of these profiles will be watched with particular interest owing to the heavy fall of snow in Lost Creek Watershed and the forecasted heavy run-off in the spring.

Run-off Plot Records

A change has been made in the method of plotting rainfall and run-off from the run-off plots now being worked up by Sundling. The cumulative graphs are so plotted that intensities of rain and run-off may be read from the respective graphs by the angle of slope of the graphs. Intensities to minimum time intervals of 5 minutes may be read in this manner.

The Meaning of Means

In working up temperature and relative humidity records for southern California and the foothills of the Sierra, Lowdermilk has dispensed with mean values, where they represent the averages between maxima and minima. A mean is recognized of value only when it represents an integration of a continuous graphic record throughout a day. Planimetering daily graphs has been employed in integrating such values. The work entailed in this procedure is time consuming and has been done only for specific instances. There reside in Hygro-thermographic charts data that may never be fully worked up.

Waste of Storm Water in Southern California

Lowdermilk has called attention to the waste into the ocean of millions of dollars worth of water in the run-off of recent storms. Despite the impoverished state of the natural underground storage basins of southern California several hundred thousand acre feet of storm water, valued at $20 per acre foot, have flowed past the porous outwash fans and have completely escaped conservation. Even where facilities exist for spreading and sinking water, millions of dollars worth of water have not been diverted to spreading grounds because the flow was muddy. Muddy waters seal spreading grounds and prevent conservation of subsequent flows.

The following requirements were cited as necessary for maximum conservation of waters from local watersheds:

1. Complete mantles of vegetation on mountain slopes and its accumulation of litter for maximum erosion control, and clarity of storm water.

2. Check dams in the channels to establish base levels of cutting and successively to unload storm run-off of its burden of sediments, and to reduce the cutting energy of storm flows.

3. More flood control dams to regulate storm flow for spreading operations, as well as to protect against floods.

4. The more general development of spreading works for the effective spreading of storm flows over large areas of porous outwash fan material.

5. Maintenance of spreading grounds in a cover of natural vegetation such as chaparral or herbage to facilitate percolation. It is probable that grazing on spreading grounds should be prohibited to induce maximum percolation.

Ecological Studies

As a necessary prelude to an analysis of vegetative development on the various run-off and erosion plots, Ilch devoted a large part of the month to the long-postponed task of working over the collections of plant specimens from the plots under Kraebel's direction. The importance of this task lay in checking the uncertain field identifications and running down the unknowns.

Weekly observations were begun of volunteer vegetation in Lowdermilk's large water-cycle tanks where nature unaided is developing the cover wanted to supplement the shrub cover to be planted later.

Range Research

During the month, two examinations were made of the series of temporary observation plots, established to show the progress of forage growth during the winter, on certain foothill ranges.

Renner continued work on his manuscript for a bibliography of western range publications.

Hormay began the preparation of a small, selected series of mounts of young seedlings of annual plants found on the observation plots. These mounts, consisting of several different-aged specimens of the

same species, will be given a trial as aids to the identification of foothill annuals in the early stages of their growth.

Director Kotok and Talbot, with J. W. Nelson of the Regional Office, and Woodbridge Metcalf of the University of California, attended a two-day meeting of stockmen, local forest officers, extension workers, and representatives of the State Division of Forestry, two lumber companies, one railroad, and a large public utility. At this meeting, arranged by Farm Advisor Smith of Tehama County, a heavy majority of the stockmen urged a modification of the existing policy of the Forest Service, to permit the burning of certain national forest areas whose grazing capacity has been materially reduced by the growth of "brush".

The administrative position of the Service was explained and discussed, pertinent high lights of the fire studies by the Forest Experiment Station and by the University of California were presented, and the broad aims of the new grazing work of the Station were outlined. It is anticipated that a committee of stockmen and other interested land owners will be formed, to cooperate with the Station and the University in planning future research. The frank exchange of viewpoints revealed again the many sides of this "burning question," and the inevitable conflict of major land uses in the region.

## Fire Research

### Visibility Study

The work of evaluating thirty-two mapped points and selecting a system giving adequate detection to the east side of the Shasta Experimental Forest, has been completed. The total area of this portion of the Forest is 1,162,000 acres, of which 441,000 acres fall into fire occurrence zones of appreciable intensity. The remaining 721,000 acres have a very light fire business which does not permit division into zones.

Methods of lookout evaluation and selection, originally worked out for the Sacramento Unit, were employed. The test thus given to the technique indicates that a systematic basis is provided by it for lookout selection. While the results on the east side were not as striking as those in the Sacramento Unit, yet an appreciable increase in coverage was secured by careful selection.

It is evident that it is more important for a lookout to view an area which has five fires per thousand acres for a 10-year period, than an equal area which has only one fire per thousand acres for a like period. With this in mind areas of fire occurrence were weighted

according to the average number of fires per thousand acres for the past decade. The following table gives a comparison between the weighted coverage provided by the existing and proposed detection systems.

Coverage in per cent of Weighted Area of Fire Occurrence Zones

| | Intensity of Fire Occurrence | | | | |
|---|---|---|---|---|---|
| | High | Medium | Low | Very Low | All Intensities |
| Area in each class M of acres | 8 | 339 | 94 | 720 | 1,162 |
| Coverage by existing system 6 peaks | 87% | 67% | 65% | 54% | 64% |
| Coverage by proposed system 9 peaks | 100% | 86% | 70% | 66% | 79% |

It was brought out that, had a detection system been chosen originally by a systematic evaluation, six points could have been chosen which would have given 71% coverage in place of the 64% secured by the existing six points system. For the complete proposed set up, 5 of the original peaks were retained on the basis of their detection rating (no weight given to the fact that they are now occupied).

On an unweighted basis the existing system provides coverage for 60% of the total area as compared with 74% for the proposed system.

Another indication of the value of detection planning is brought out by the number of fires which fall in the blind areas of the existing detection system and those which would have occurred in blind areas had the proposed detection system been in effect for the past decade. This comparison is shown in the following table.

| | Total Fires 1921-1930 | | | Point of origin in blind areas | | |
|---|---|---|---|---|---|---|
| | A & B | C | Total A-B-C | A & B | C | Total A-B-C |
| Existing system | 536 | 80 | 616 | 162 | 32 | 194 |
| Proposed system | 536 | 80 | 616 | 61 | 3 | 64 |

From a financial standpoint it may not be possible to provide for the complete proposed system. However, an order of priority based on actual detection value has been set up which will allow the greatest value to be secured from any given number of peaks.

Products

Logging and Milling Study

After trial and rejection of a half dozen methods for distributing costs to different sizes of logs in mixed loads handled as units, we feel satisfied at last that a system has been found which shows the true effect of the size variable - or as close to the true effect as can practicably be worked out where mixed loads are concerned. The method, developed by Logging Engineer Berry of Region 5, and now being applied to the Stanislaus woods study data by Professor Krueger of the University of California, is applicable to tractor skidding or donkey skidding when two or more logs are yarded in one turn, to big wheel hauling and to log car transportation.

In tractor skidding, loads of more than one log are first classified by volume. These classes are in 100-foot B.M. intervals, based on the gross scale of the load. A curve is then prepared showing the number of tractor crew minutes required to skid these different volumes over the average yarding distance. "In" time, "choker" time, and "hang-up" time, the items varying by size of load and number of pieces, varied from3.66 minutes per load of 100 feet B.M. to 17.48 minutes for loads of 4200 feet in the Stanislaus study.

A tabulation is then prepared from the field data for each tractor load showing the volumes of logs in each diameter allocated to loads of different size. For example, when all 10-inch logs are accounted for, the table shows that 2% of the total volume was skidded in 100-foot loads, 5% in 200-foot loads, 10% in 300-foot loads, and so on to the largest load in which 10-inch logs were included. The time per M.B.M. for all 10-inch logs is then derived by weighting the time per man for each load by these percentages. Species differences are calculated from the relationship of the average log of a given diameter for one species to the average log of the same diameter for all species combined.

A similar system is used for railroad transportation except that a constant cost per car is used as the original basis for determining the cost per M.B.M. for the different sized loads hauled.

The so-called "abridged" edition of the results of this study will be completed in manuscript form before the end of March. The cumulative cost curves in this edition incorporate yarding and transportation figures worked out by the method of least squares. The detailed report to be published later will include the results of both the least

squares method and the latest method as described above.

White Fir Mill and Depreciation Study

The 4 Common and Better nominal green lumber tally for this study underran the net scale by 6.5%. Due to excess sawing thickness and peculiarities in the manufacture of 6/4 white fir, there should be a correction factor applied to this tally which will bring the overrun somewhere between + 3.3% and -1.6%. That a correction factor of between 5% and 10% should be added to the nominal tally should be kept in mind when reading the following table showing the 4 Common and Better nominal green lumber tally overrun per cent for logs from various parts of the tree.

| | |
|---|---|
| Butt logs | - 12.6% (Underrun) |
| Second logs | - 2.5% " |
| Middle logs | - 6.8% " |
| Top + next to top logs | + 1.5% (Overrun) |

The above table shows a rather surprising difference between the ability of the scaler to estimate defect correctly in butt logs and in logs from other parts of the tree. A detailed analysis of butt logs showing heavy underrun indicates that shake and spiral split are the principal causes. Evidence of frost crack, wind check or shake can usually be detected by the scaler, but apparently larger allowances must be made for these defects in butt logs than for logs from other parts of the tree.

California Economic Research Council

At meetings of the Natural Resources Committee and the Executive Committee of the Council during the month the land utilization progress, particularly in the Eldorado County cooperative project between the University of California and the California Forest Experiment Station was commended. It was decided that under present economic conditions watchfulness to prevent if possible disastrous reductions in the State or other financial support of projects already started through Council activities in the Natural Resources field, such as the State Snow Survey administration, the enlarged topographic survey program, etc., could advantageously replace pushing for new undertakings for the time being.

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## CENTRAL STATES FOREST EXPERIMENT STATION

### General

Several changes have been made in the Central States Forest Research Council. It is a pleasure to announce the appointment of Alexander Thomson for a period of three years, beginning January 1, 1932. Mr. Thomson is well known to many of the members as President of the Champion Coated Paper Company of Hamilton, Ohio, and as 1931 President of the Central States Forestry Congress. He is also successfully engaged in reforesting a privately owned two-thousand acre tract of land in southern Indiana, where he has already planted over 350,000 trees.

The annual meeting of the Ohio Forestry Association was held at Ohio State University during Farmers' Week (February 3) and was very well attended. State Forester Secrest presided, and Professor Wiesehuegel of the O. S. U. forestry department was elected president for 1932. The Station contributed to the program. Dr. Auten gave an illustrated lecture dealing with his investigations of forest litter and soil porosity, and Baker read a paper regarding the common problems of forestry and agriculture. The Extension Foresters of Ohio and Indiana afterwards requested mimeographed copies of this paper for distribution to County Agricultural Agents.

Congressman Scott Leavitt was unable to give his talk on forestry and erosion, as he had planned, but his paper was read at the meeting, and was afterwards broadcasted from Station WEAO by Professor Wiesehuegel.

Baker represented the Station at the annual meeting of the National Drainage, Conservation, and Flood Control Congress in Louisville, Kentucky, February 17-19, and served on the resolutions committee. Other foresters of the region who contributed to the program were District Forest Inspector Bruner, and State Foresters Jackson of Kentucky and Wilcox of Indiana. Director Raphael Zon of the Lake States Station gave a talk on the control of erosion by reforestation, and Chief Lecturer H. N. Wheeler of the U. S. Forest Service, Washington, gave an inspiring forestry talk at the evening banquet. The importance of forests as an aid to erosion and streamflow control was given great emphasis throughout the meeting, and the observations were well received by the engineers and conservationists in attendance.

### Forest Litter Project (M-1)

Dr. Auten spent the past month in laboratory work on forest litter and soil samples taken last summer. His results clearly indicate the lack of correlation between the acidity of forest soils and the available bases. He finds that the most acid forest soil will often have the highest percentages of readily soluble calcium and magnesium. Organic matter has a great capacity for bases and may be unsaturated with lime even though the total amount is high.

It appears doubtful that a pH test has much significance, of itself, as a criterion of forest soil productivity. Abandoned field soil often has a higher pH (lower acidity) than does an adjacent virgin forest soil, even though the lime has been excessively leached out of the field soil by many years of cultivation and exposure.

The present comparative study of forest and field soils is bringing to light the essential differences between the worn out field soils, and those under forest cover, and emphasizes the benefits of forest litter. Apparently a good forest litter is the key to productivity. By means of litter the bases may be returned to the soil. The destructive effects of erosion are very evident in the abandoned field soils, where the loose upper horizons of the original forest soils have been lost. Here the accumulated organic material and bases have been washed away, and the compact, relatively infertile subsoil exposed. This study is making the difficulties of successful reforestation of abandoned fields more obvious and understandable.

## Forest Plantation Project (Fp-1)

Kellogg has continued the work of compilation and analysis of the plantation black walnut data in the Washington office, and plans to continue there through the month of March. The various yield and volume tables are nearing completion, with satisfactory results. Recently attention has been given to the factor of original spacing in walnut plantations. From the work completed, there is apparently little correlation between original spacing and site index, or between spacing and height or diameter growth, but there appears to be high positive correlation between spacing and survival, as well as between age, spacing, and survival.

## Locust Borer Project

Dr. Hall spent the week of February 14-20 in Washington, D. C., conferring with Bureau of Entomology officials on the progress of the locust borer investigation, and on plans for the 1932 field season. On February 5, he attended a meeting of the Ohio Entomologists in Columbus, where the project was discussed with the various entomologists working in Ohio.

Further compilation of field data gathered in 1931 indicates that, in the plots studied, borer damage was much greater in grazed areas than in locust stands where grazing was not permitted.

Woodland Grazing Project (M-2)

Most of Day's time during the month has been given to a final revision of the manuscript "The Natural Regeneration of Farmwoods Following the Removal of Livestock." Kuenzel has assisted Day in getting the manuscript in form for the printer and in the preparation of the charts and graphs.

Kuenzel is also compiling and analyzing data from the 1930 census, which will be used in connection with the report on the Reconnaissance Phase. The 1930 census contains considerable data on acreages of woodland and pasture by townships and other minor civil divisions. These data in the past have not been available except by counties, and it is believed that certain very definite relationships will be revealed between such data as the intensity of agricultural use, the intensity of grazing, the per cent of woodland grazed, the per cent of total pasture land which is wooded, and the total acreage of woodland.

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INTERMOUNTAIN FOREST AND RANGE EXPERIMENT STATION

Investigative Committee Meeting

The Regional Investigative committee meeting was held in the Regional office on February 23 and 24. In addition to members of the Regional and Station offices the meeting was attended by representatives of the Utah Agricultural College, University of Utah, Brigham Young University, the Biological Survey, American Smelting and Refining Company and the Utah State Farm Bureau. The absence of stockmen this year reflected the influence of the depression.

Of special interest was a discussion of the present economic condition in relation to the research program. The questions were asked: Are the present projects producing information of value in getting out of the trough of depression? Should research programs be more flexible in order to allow for attention to immediate problems of the day? Another point raised was the following: Is research responsible for developing the present tendency for detail in land management (more specifically, the range management in R-4) that allegedly is becoming irksome and causing the present dissatisfaction with government management on the part of the land users? There are questions worthy of careful consideration and an immediate answer is not forthcoming.

## Revegetation of Browse Species in Oak Zone

In 1926 four 33 x 33' plots were established at two areas in the oak zone at the Great Basin Branch Station. Two of these plots, one fenced and the other grazed, were located where birchleaf mahogany predominates. The other two, one grazed and the other ungrazed, were located where snowberry predominates.

All browse species on these plots were mapped in 1926 and remapped in 1931, to show the crown spread up to a height of 54 inches.

The following table shows the per cent gain or loss in crown spread of browse species on the four plots in 1931 as compared to 1926.

### Birchleaf Area

| Species | Ungrazed Plot per cent increase or decrease | Grazed Plot per cent increase or decrease |
|---|---|---|
| Cercocarpus montanus | + 56 | - 20 |
| Quercus gambelii | + 39 | - 9 |
| Symphoricarpos oreophilus | + 12 | - 32 |
| Total Density of browse species | + 54 | - 19 |

### Snowberry Area

| | | |
|---|---|---|
| Symphoricarpos oreophilus | + 153 | + 52 |
| Artemisia tridentata | + 6 | + 64 |
| Sambucus caerulea | + 247 | - 11 |
| Total density of browse species | + 75 | + 44 |

All species on the ungrazed birchleaf plot showed a remarkable increase since 1926 while the same species on the grazed plot showed a decrease.

All species on the snowberry ungrazed plot showed a large increase with the exception of sagebrush (Artemisia tridentata), a plant of low palatability, which showed only a small increase. All species on the grazed plot increased except elderberry (Sambucus caerulea), a very palatable shrub, which showed a decrease.

The heavy decrease on the grazed birchleaf mahogany raises many interesting speculations. Obviously the degree of grazing in practice is too heavy for this subtype, although it is on the same range with the snowberry, the two plots being one-half mile apart. The decrease in the birchleaf sub-type had not been obvious to inspection, which indicates the need for careful measurement to determine change in

the browse type. Season of grazing may be an important factor as the snowberry sub-type is more heavily utilized during the growing season and the birchleaf is not grazed extensively until in late fall.

Management Sagebrush - Bunch Grass Range

Craddock spent the major portion of the month continuing the analysis and assembling the information into manuscript form. The first section of the manuscript, dealing with Sheep Experiment Station data, covering the influence of climate on range vegetation and carrying capacity is about completed and a substantial start made on the second section pertaining to the influence of different systems of grazing. W. A. Denecke and J. M. Cooper of the Sheep Experiment Station spent a few days in the office with Craddock and Forsling discussing certain animal husbandry phases of the study which will constitute a third section of the report dealing with the influence of climate and different systems of grazing on livestock condition and yields.

The two visiting sheepmen brought interesting notes regarding the winter conditions for livestock in southeastern Idaho and southern Montana. Denecke, who was formerly superintendent of the U. S. Sheep Experiment Station, in the past year has been affiliated with a well established sheep company in Montana. He reported that heavy snows in the vicinity of Bozeman, Montana, during Thanksgiving week necessitated feeding of all range sheep. Warm "chinook" winds quickly dissipated the snow, however, and since then winter grazing has been exceptionally good. Cooper, who succeeded Denecke as Superintendent of the Experiment Station at Dubois, reported heavy snows in November also, but instead of disappearing, more snow was added at Christmas time which completely marooned many bands of sheep winter grazing on the semidesert range in southeastern Idaho. The Experiment Station herds were among those marooned, some 40 miles from the feed lots. It took ten days to trail the sheep through the snow to the hay stacks. Two parallel trails were broken in the snow by dragging logs behind six head of horses. Cotton cake was scattered in the trails along which the sheep traveled single file. Hay stacks were reached midway to the main feed lots but for five days the animals were without roughage. After filling and resting at these provident hay stacks, the second portion of the journey to the main feed lots was made in three days. The vigorous condition in which the animals reached the feed lots, as compared to the losses and extremely poor condition of other outfits who suffered equally trying experiences, Mr. Cooper attributes to the long established practice of the Experiment Station of feeding supplemental feed while on the desert range and of providing caches of hay at strategic points along the trail. Hay in southeastern Idaho is at a premium and it is feared the supply will be exhausted before spring forage is available. Some outfits are feeding only one pound of hay with one pound of grain or cotton cake per head per day. It appears certain that heavy premature grazing will be practiced on much of the spring-fall range unless the present winter conditions are alleviated by an early spring.

## Land Utilization in Utah

The study of land tenure and utilization in Utah, mentioned in the January monthly report, has been completed in the rough draft and partly checked. Subject only to minor changes as a result of complete checking, three tables are presented, one which summarizes land control and utilization in relation to availability to grazing use, one on utilization of cropped land, and a third which shows the sources of income obtained by farmers in 1929.

Land utilization in Utah is summarized in Table 1. Although Utah is thought of primarily as an irrigated state, the total land area utilized for irrigation in 1929 was only 1,324,000 acres or 2.5 per cent of the area of the state. Dry farming is also usually thought of as an important contributing phase of agriculture, and yet somewhat less than 500,000 acres, or less than 1 per cent of the total area is so utilized. Most of the remaining land is used for grazing, there being perhaps 5 million acres that is pure desert, bare rock, or on inaccessible and rough slopes. Thus, approximately 44.5 million of Utah's 52.6 million acres of land is used for grazing. This is about 84.6 per cent of the entire land surface of the state. Of this, somewhat more than half (47.8 per cent of the entire area) is still open public domain, and much of it still unsurveyed. The amount of feed per acre on this so-called "public domain" was estimated in 1916 to be only half what it originally was.

Much of the range area is inefficiently utilized. The chief contributing causes to inefficient use are:

(1) Lack of accessible watering places;

(2) Lack of roads and trails;

(3) Lack of fences, corrals, and similar improvements;

(4) Bad seasonal management and unequal or otherwise poor grazing practices; and

(5) Ruined forage, resulting from all of the four preceding reasons.

Table 1. Summary of land utilization and control in Utah, 1930.

| | Acres | Per cent |
|---|---|---|
| **Land Utilization** | | |
| Irrigated land | 1,324,125 | 2.5 |
| Dry farm land | 500,000 | 1.0 |
| National Forest (Mostly grazed) | 7,475,276 | 14.2 |
| Indian lands (Mostly grazed) | 452,627 | .9 |
| Privately owned--not in crops (exclusive of railroad land) (mostly grazed) | 9.200,286 | 17.5 |
| Coal and mineral reserves (mostly grazed) | 1.718,382 | 3.3 |
| Public domain (largely grazed) | 25,147,867 | 47.8 |
| Unperfected entries | 1,362,097 | 2.6 |
| Remaining state land (largely grazed) | 2,800,000 | 5.3 |
| Railroad land (largely grazed) | 2,500,000 | 4.7 |
| National Parks and Monuments (not grazed) | 117,100 | .2 |
| T O T A L | 52,597,760 | 100.0 |
| **Not Grazed** | | |
| Less waste (alkali flats, bare rock, inaccessible, etc.) | 5,000,000 | 9.5 |
| Farmed land | 1,824,125 | 3.5 |
| Parks and Monuments | 117,100 | .2 |
| Building sites, minicipal, etc. | 1,000,000 | 1.9 |
| Less military reservations | 31,888 | .1 |
| Other | 100,000 | .2 |
| Less Total not grazed | 8,075,113 | 15.4 |
| Total area in Utah grazed | 44,524,647 | 84.6 |
| **Land Control** | | |
| Privately owned | | |
| Land in farms | 5,613,101 | 10.7 |
| Railroad lands | 2,500,000 | 4.7 |
| Other owned lands (towns, streets, walks, corporate) | 5,411,310 | 10.3 |
| Publicly owned (including Unperfected entires) | 39,073,349 | 74.3 |
| Total Land Surface of State | 52,597,760 | 100.0 |

Cropped Lands

Table 2 gives the total acreage and total value of all important farm, truck and orchard crops, so far as the data are available in the census reports.

60 per cent of all Utah's cultivated land grows hay, which is about four-fifths alfalfa. There are also 35,000 acres of alfalfa seed which makes Utah stand far ahead of any other alfalfa seed-growing state in the Union, until the last three or four comparatively poor seed years. In addition there are 57,000 acres of tame hay other than alfalfa, besides 69,000 acres of wild hay not included in the area of cultivated crops.

The grains - wheat, oats, barley, corn and rye - occupy 32.5 per cent of the cropped area. This includes the dry farm wheat as well as the recent important increases in barley acreage.

Sugar beets used 3.7 per cent of the cropped land but represent 13.9 per cent of the total value of crops produced in 1930. During the last several years sugar beets have greatly decreased in position as regards acreage. This is thought to have been due to the three major factors: (1) serious epidemics such as leafhopper and rootrot; (2) some uncertainty as to price; and (3) competition as between other crops and beets.

Table 2. Land area devoted to each major crop by groups, and value of crop harvested, both expressed also in percentages (1930)

| | 1930 | | Percentage of state total | |
|---|---|---|---|---|
| | Acres (thousands) | Value (thous) | Acres | Value |
| **Hay** | | | | |
| Alfalfa hay | 579 | $8,573 | 49.0 | 30.6 |
| Other tame hay | 57 | 1,139 | 5.0 | 4.1 |
| Wild hay | 69 | 517 | 5.8 | 1.8 |
| Alfalfa seed | 35* | 391 | 3.0* | 1.4 |
| All hay | 705 | 10,620 | 59.8 | 37.9 |
| Ratio acreage to value | | | .63 | |
| **Grain** | | | | |
| Winter wheat | 194 | 2,732 | 16.4 | 9.8 |
| Spring wheat | 82 | 1,784 | 6.9 | 6.4 |
| Oats | 46 | 754 | 3.9 | 2.7 |
| Barley | 42 | 939 | 3.6 | 3.3 |
| Corn | 16 | 496 | 1.4 | 1.8 |
| Rye | 3 | 16 | .3 | .05 |
| All Grain | 383 | 6,721 | 32.5 | 24.0 |
| Ratio acreage to value | | | .74 | |
| **Root Crops** | | | | |
| Sugar beets | 44 | 3,874 | 3.7 | 13.9 |
| Potatoes | 12 | 1,296 | 1.0 | 4.6 |
| All root crops | 56 | 5,170 | 4.7 | 18.5 |
| Ratio acreage to value | | | 3.93 | |
| **Vegetables** | 25.7 | 2,258 | 2.20 | 8.06 |
| Ratio acreage to value | | | 3.66 | |
| **Fruits** | | 2,086 | | 7.45 |
| Ratio acreage to value | | About 3.50 | | |
| **Crops not reported** | 9.0 | 1,000 | .76 | 3.57 |
| Total in crops | | 1,180 | 100 | |

*Alfalfa seed acreage largely cut for hay and included in acreage of alfalfa hay.

The 12,000 acres in potatoes is a wide fluctuation from the 22,000 acres in 1927. However, even with a relatively poor crop and with a rather low price, the 1.0 per cent of cropped land in Utah produced in 1929 4.6 per cent of the total crop value.

The total acreage of truck and fruit in Utah is almost negligible being only 2.2 per cent of the cropped land for truck and about 2.5 per cent for fruit. The total returns are 8.6 per cent truck crops and 7.5 per cent for fruit. Combined all vegetables and all fruits represent only about 15 per cent of the total crop value.

About 92 per cent of the cropped land is in feed crops and wheat, with wheat using somewhat over 20 per cent of the crop land. This leaves out of consideration farm pastures and range lands which are utilized entirely for animal feed.

Sources of Income

The various sources of income of Utah farmers according to the 1929 census are shown in Table 3. The total livestock income was $43,995,000 of which $23,856,000 (from wool, mohair, beef and veal, and mutton and lambs) was produced largely on the range. Of the crop products, all the hay and forage, about one-third the cereals and by-products from the other crops were consumed by livestock. Of these feeds, probably 50 per cent was consumed by range livestock.

Table 3. Income of Farmers in Utah in 1929

| Crops | | Livestock | |
|---|---|---|---|
| *Hay & Forage | $14,862,000 | Dairy Products | $9,360,000 |
| *Cereals | 7,796,000 | *Wool | 5,843,000 |
| Other grain & seeds | 980,000 | Mohair | 98,000 |
| Vegetables (incl. potatoes) | 4,645,000 | *Beef and veal | 8,805,000 |
| Fruits and nuts | 2,537,000 | *Mutton and lambs | 9,110,000 |
| Sugar beets | 3,876,000 | Hogs | 1,787,000 |
| Home gardens produce | 564,000 | Poultry | 3,479,000 |
| Nurseries & greenhouses | 199,000 | Eggs | 5,313,000 |
| Forest products | 36,000 | | |
| T o t a l | $35,495,000 | | $43,795,000 |
| * Largely from Grazing (total) | | | 23,856,000 |

The 85 per cent of the land area of the state used for grazing, therefore, is basic to approximately one half the agricultural income of the state and in addition the range livestock consume a large share of farm grown feeds which make up over 35 per cent of the agricultural income. This vast grazed area needs study and attention to increase its productivity.

Transect Studies

One of the striking vegetative features of the Utah-Nevada winter range is the distinctly belted distribution of the browse vegetation. General observation of several such areas led to the idea that the distribution of the vegetation was correlated with certain soil qualities and with minor but distinct differences in elevation. In view of the vast differences in palatability of the species and the deep-seated opinion of stockmen of equally great differences in nutritional value it was thought necessary to make a study of such distribution.

Two transects, 50 feet in width, which cut across the belts of vegetation were laid out, one in western Tooele county on the bottoms of the prehistoric Lake Bonneville and another in western Millard county, above the highest shore line of Lake Bonneville.

The north (Tooele County) transect, designated as Skull Valley transect, was about two miles long with mapping stations every 100 feet. The surface soil profile and bridge alkali determinations were made. Soil samples to a depth of 6 feet where possible were taken in each of

the major vegetative types. These are to be studied in the laboratory. The vegetation was mapped on the 50-foot transect strip and the density of vegetation by the principal species was estimated at each 100-foot interval.

The southern transect, designated as the Burbank transect, was about 4-1/2 miles long and mapping and density stations were 200 feet apart. Otherwise the method of study was the same as for the Skull Valley transect.

The two areas are on sites different in potential productivity, have had a very different grazing history, and hence are not comparable with each other as a whole. However, the individual types within each group may be compared with each other. This comparison is shown in the following table:

Densities of various vegetative types in two widely separated areas on the "West" Desert (Utah-Nevada) winter ranges.

| Type | Total densities | |
|---|---|---|
| | Skull Valley | Burbank |
| Juniper | .0167 | .0183 |
| Shadscale-little rabbitbrush | .0500 | - |
| Greasewood | .1000 | .0136 |
| Kochia (Salt flat perennial) | .0450 | - |
| White sage | .1500 | .0294 |
| Shadscale | .0939 | .0429 |
| White sage-shadscale | .1150 | .0464 |
| Little rabbitbrush | .1406 | .0350 |
| Little Rabbitbrush-white sage | .1287 | .0317 |
| Black sage-shadscale | - | .0404 |
| Black sage-white sage | - | .0380 |

A striking feature, to people who are more familiar with the vegetation of foothill and mountain vegetation, is the comparatively low density of the desert vegetation.

## Utilization of Winter Range, 1931-1932

During the last ten days in January 1932 an inspection trip was made to the desert to determine the degree of utilization of the various plants found there. Nineteen winter bands, representing 64,000 sheep, were contacted. The herders and owners of each were interviewed to obtain information concerning the condition of the sheep and of the desert ranges. Careful observations were made of the feeding habits of each band to determine the degree of utilization of the different plants.

Forage on the desert this year was estimated to be less than 50% of normal, most of this was immature and probably lacking in nutritional value. It is believed that much of the nutritional deficiency in the forage can be attributed to the lack of seed production, thus lowering the grain ration that is normally obtained by eating the seeds of the grasses, white sage, and shadscale.

At the time of inspection snow had covered most of the feed, leaving only a small amount of forage in the open valley bottoms available to the sheep, and in most cases this had been grazed heavily in the fall at the time the sheep trailed to the desert.

The snow on the valley bottoms varied from 1/2 to 7 inches deep with an average of 3 to 4 inches. In the mountains the depth varied from 12 to 16 inches, having a crust of about 6 inches in most places. During the inspection the temperatures dropped to -3° to -14° at night.

Losses have been much heavier than normal this year due to the long extremely cold period and the limited and deficient forage supply. Losses have varied from 3.33 to 17.12 per cent with an average of 7.64 per cent for all the herds visited. The causes of the losses are as follows:

| | |
|---|---|
| 1. Starvation and cold | 90% |
| 2. Coyotes | 4% |
| 3. Lip and leg disease | 5% |
| 4. Other causes | 1% |

The sheep are very poor this winter with the exception of one or two herds that were given supplemental grain rations of 1/4 lb. of corn per head per day. Herds that had been given this ration from the middle of December were in good condition and showed the lowest losses recorded.

On account of the limited and deficient supply of forage, the utilization has been extremely close this year. Practically every plant that is palatable, even in a small degree, is being grazed or utilized completely. It is not believed that the figures obtained this year will be applicable to those for normal years.

Following is a list of plants showing their degree of present utilization:

| | |
|---|---|
| Black sage (Artemisia nova) | 100% |
| Rice grass (Oryzopsis spp.) | 100% |
| White sage (Eurotia lanata) | 100% |
| Brigham tea (Ephedra spp.) | 65% |
| Russian thistle (Salsola pestifer) | 35% |
| Yellowbrush (Chrysothamnus spp.) | 30% |
| Galleta grass (Hilaria jamesii) | 30% |
| Shadscale (Atriplex spp.) | 15% |
| Grama (Bouteloua spp.) | 5% |

## Erosion and Streamflow

### Granitic Soils-Boise

"Reference has been made to small valleys in the area underlain by the Boise granite, which are so deeply filled with debris that they have no surface streams, all of the water that comes to them being absorbed by the unconsolidated material forming their floors. The valleys of this description were, up to within about 15 or 20 years, much more numerous than at present. A recent change has occurred which has caused fresh stream channels to appear in previously streamless depressions, gulches, etc., and even on hillsides formerly completely soil-covered. The change referred to is well known to ranchers and others, and is said to have been begun about 1880. At present there are numerous lateral depressions and gulches, branching from the larger valleys, which have fresh channels cut in their floors and in the sides of the adjacent hills, that are from 10 to 15 or more feet deep and a mile or more long, with perhaps several branches, but which previous to the date just given are known to have had smooth, unbroken contours. In several instances well-traveled roads have been crossed by these gullies, necessitating a wide detour to get about a steep-sided gulch from 10 to 15 feet deep. It does not require historical evidence, however, to show that the gullies referred to are recent. They are fresh cuts, with nearly vertical walls of loose earth, and at their heads begin abruptly. Each rain that comes is assisting in their extension and enlargement. At certain localities, which are unfortunately numerous, cultivated fields have been cut across by gulches formed during the last few years which are still enlarged. One conspicuous result of the more complete drainage of valley bottoms by modern rill channels is the dying out of formerly luxuriant meadows of wild grasses and their replacement by sage brush. The rapid erosion in progress is destroying much of the finest land in the mountain valleys lying north of the Snake River Plains, and its prevention is an exceedingly important problem, which demands immediate attention.

"The beginning of this recent erosion is correlated with the introduction of sheep in large numbers into the country, and is but another phase of the widespread destruction for which sheep raising on a large scale is responsible. The cause of the washing is mainly the destruction of the once abundant bunch grass by the close grazing of sheep.

"It might, perhaps, be thought that if sheep raising could be discontinued or properly controlled the destructive washing of the land incident to it under certain combinations of soil and climatic conditions would be arrested, but the process of erosion once started is difficult to stop, and will continue even if the sheep were removed."***

"The destruction by recent rill erosion is not confined to the upland valleys, but by reason of the immense amounts of gravel and sand swept down to the larger streams, causes them to spread out sheets of this material on their flood plains, which bury the vegetable mold and greatly impair and even destroy the agricultural value of the land."--Israel C. Russell--1902.

The above excerpt, much as it may sound like it, is not from a recent report on erosion on the Boise river watershed. It is from a report by Israel C. Russell, a geologist of the Geological Survey, following studies which he made in Idaho in about 1902 and applies to the mountains (probably to the foothills and lower mountain slopes), bordering the Snake River Plains on the north between Arco and Emmett or Payette. The area of most recent concern is farther back on the watersheds and extends to the higher elevations.

The area which it is considered Russell refers to still shows the effects of relatively recent past erosion. The better surface soil of the slopes is gone and gully scars are prevalent. The slopes are covered with a fair stand of annual downy brome grass, which is more or less abused by recurrent overgrazing and fire. At the higher elevations where the present more destructive erosion is taking place, conditions are too severe for the invasion of the downy brome.

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## NORTHEASTERN FOREST EXPERIMENT STATION

### Research Council

The sixteenth meeting of the Northeastern Forest Research Council took place in Boston, Mass., on February 2, 1932. This meeting was attended by fourteen members of the Forest Service and a group of entomologists from other agencies in the region. The morning session was held in conjunction with the New England Section, Society of American Foresters.

Primary attention was given to consideration of the European pine shoot moth situation which is assuming alarming proportions in the southern portions of the region. Studies of life history and control of this insect are in progress at the Connecticut Agricultural Experiment Station and the New York State College of Forestry while some work with parasites has been undertaken at the Gipsy Moth Laboratory of the U. S. Department of Agriculture. Pending the development of an effective and cheap control the immediate need is for definite knowledge of the dispersion of the insect and arrangements for cooperation by all states

and other agencies in destruction of severely infested plantations, scouting for new infestations and undertaking control measures. A committee of the Council was appointed to stimulate suitable action in this matter. The discussion also led to a general resolution which would place protection of the forests from insects and disease on the same basis as protection from fire, by making state and federal funds currently available for eradicating outbreaks in their initial stages.

The need for further studies of the relation of forests to water resources was another topic considered at this meeting. Behre outlined the widespread importance of water resource problems and explained the proposed amendment to the McSweeney-McNary forest research act to set up a program for studies in this field. This program is of especial interest to the Northeast from the standpoint of conservation of water supplies for areas of dense population. The council endorsed the program for research in this field as proposed in the Leavitt Amendment.

The third subject discussed at the Boston meeting was the place of forest research in reorganization of federal bureaus. This subject was presented by R. E. Marsh, who stated that he felt the research work should remain with the Forest Service, and pointed out many reasons why this work was more closely allied to the Department of Agriculture than other departments. In the discussion of this subject it was emphasized that foresters should recognize changing economic conditions and changing attitudes of the people toward government and be ready to lead in framing policies to meet new conditions.

## Growth and Yield of Northern Hardwoods

In analyzing permanent plot data for the northern hardwoods type in Vermont, Morey studied the diameter distribution of several even-aged plots. These plots were established during 1904 in a second growth stand 22 years old, consisting mostly of sugar maple with considerable white ash. Remeasurements were made in 1915 and 1925. The diameter distribution curves for sugar maple were "J" shaped for all years, tending to flatten out, however, with increase in age. The white ash curve for 1904 was likewise "J" shaped but had a slight tendency at the upper diameters to form a curve similar to the end of the normal frequency curve. In 1915 the ash formed a semi-normal frequency curve and in 1925 the curve had developed into the typical normal frequency curve skewed, however, toward the smaller diameters. This difference in the curves of these two species is probably the result of the difference in their light requirements.

## Management of Spruce

How to apply the idea of girdling in the woods to best advantage has been a subject of study by members of the Stand Improvement Committee of the New England Section of the Society of American Foresters.

In girdling to release spruce crop trees, the committee believes it is best to assume a definite diameter limit for spruce to be released, then girdle only such worthless hardwoods as are suppressing spruce trees above the diameter limit selected.

The committee believes that a succession of girdling operations is better than a heavy operation at one time. In following such a scheme the first girdling operation might well be undertaken 15 years before spruce logging. This girdling should be for the release of healthy spruce trees 6 inches and above in diameter. Five years later a second girdling to release spruce trees from 2 to 6 inches in diameter followed by a third girdling for the release of reproduction between 4 feet in height and 2 inches in diameter should be undertaken. Thus at the time of logging the merchantable sized spruce would have experienced 15 years of accelerated growth, the 2 to 6 inch class 10 years and the reproduction 5 years. In an experimental girdling of this sort at Bolton, Vermont, 36 spruce trees per acre from 6 to 16 inches d.b.h., were released by girdling 26 hardwood trees. Sixty-eight spruce and fir trees per acre from 3 to 6 inches d.b.h. received some incidental benefit from the girdling.

## Forest Planting

During the past month plans for the work of the coming field season have been further developed. In the spring season an intensive study will be made of tree planting methods and planting technique. An attempt will be made to determine the relative costs of planting on a variety of sites with different types of ground cover.

Staked rows will be laid out on representative areas and the survival determined after the period of summer growth and again after the succeeding winter season has passed.

An intensive study of the literature of reforestation is being carried out during the winter season. Both American and European work is being extensively reviewed. It might not be out of place to emphasize one fact which stands out prominently in the work of a large number of European investigators; that is the great variability in the growth of different strains of Scotch pine (Pinus sylvestris) as influenced by climatic and soil factors. There are at least six important races of Scotch pine recognized by European foresters. None of these strains when taken from their native land has been found to give as good growth as local seed stock, even though the seed trees chosen may have been of superior form.

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## General

### Requirements for Forest Products Conference

An outstanding event of the month was the conference on the requirements phase of the Forest Survey. F. J. Hallauer was here from Washington for almost two weeks. The first part of it was devoted to conferences with Bradner of Missoula, Hill of Berkeley, and the local Products and Forest Survey men. After this conference had decided upon the methods of attacking and carrying out this requirements study, Hallauer drew up a preliminary working plan, facilitated by further talks with the local men and interviewing those outside the Service, such as Colonel Greeley, D. T. Mason, and George Cornwall.

### Experimental Forests and Natural Areas

The Experimental Forest and Natural Area Committee has recommended for withdrawal an area of 1760 acres in fine virgin spruce-hemlock and cedar near Lake Quinault, Olympic National Forest. They have also decided upon the exact boundaries for the Wind River Experimental Forest, which will be in two blocks, one on Trout Creek partly in virgin timber and partly in the 1902 burn, aggregating 6400 acres, and the other of 3500 acres in 90-year-old second growth on Panther Creek. The two blocks are about four miles apart and both are quite accessible to the present Wind River headquarters.

### Auto Costs

Of our fleet of 13 cars, 9 are Model "A" Fords, one purchased in 1929 and the rest in 1930 and 1931. They have traveled 153,502 miles, and the cumulative cost per mile is .024. They traveled in 1931 92,559 miles; the average cost per car per mile was .022. Gas requirements ran from 15.1 miles per gallon to 17.6, with the average 16.4.

### New Public Domain Project Leader Selected

Sinclair A. Wilson of Portland has been appointed as senior forest economist to conduct the new public domain study, and begins his duties March 1. Mr. Wilson has two degrees in forestry from Oregon State College as well as special training in law and economics. While he has been president of a local bank for the past 12 years, he has been very active in forestry matters in Oregon, particularly in his capacity as

chairman of the forestry committee of the Chamber of Commerce and of the forestry committee of the Oregon Bankers Association. He is a vice president of the American Forestry Association and was one of the representatives of Oregon at the Governors' Conference on the public domain.

## Fire Studies

### Reporting and Charting Lightning Storms

Tabulations of storm length, rate of travel and direction of travel were made. These analyses show that there is considerable variation in both length and rate of travel from year to year. Direction of travel is more constant, being in general northeasterly in the Blue Mountains and north or northeasterly in western Oregon; the direction of travel is less constant in Washington.

### Hour Control

Analyses of the time factors in fire control are now completed for ten west side forests. Rather striking variations in the different time factors are showing up for the individual forests.

### Static and Lightning Storms

The final report for the static study was completed in rough draft and is being submitted to several people for criticism. Tentative arrangements were made with Dr. O'Day of the Physics Department at Reed College to continue this study along half a dozen specific lines of attack. As soon as Dr. O'Day completes some preliminary investigations, definite suggestions for cooperative continuation of the study may be made.

### Lookout Visibility Tests

Further work was done on the tests made last summer on the Deschutes Forest, and the rough draft of a report prepared. The Regional Office has turned over a large amount of observations made by forest personnel last summer and requests the analysis of this material.

## Silviculture

### Methods of Cutting in Ponderosa Pine

Most of Kolbe's time during the month was spent in the analysis of plot data for this project. Comparison of plots that have been

differently treated at the time of cutting is giving very interesting results. For example, a light selection cutting was found to be more favorable to the survival of advanced seedlings than a heavier cutting. The mortality on a lightly cut plot during a 15-year period following logging and slash disposal amounted to 48 per cent of the total number of ponderosa pine seedlings and saplings, while on an adjoining plot which was more heavily cut, the loss came to 68 per cent in the trees under 4 inches in diameter. The lightly cut area immediately after logging had 7912 seedlings to the acre, while the heavier cut area contained some 4792 trees on an average. This would make it seem that competition from other seedlings was not the chief factor causing mortality. Growth in height during the period of the advanced seedlings was slightly more rapid on the heavier cut area.

## Natural Reproduction Studies in Douglas Fir

The first progress report of the study of Douglas fir natural regeneration under measured climatic and ground conditions is ready for typing. In this study seedling development and losses were observed through the growing season over a period of 4 years, and an effort made to correlate their reaction to air and soil temperatures, evaporation, rainfall, soil moisture and shade, records of which were carefully kept throughout the period. Each year brought surprises in the form of new causes of seedling loss, importance of color of surface soil, shade requirements, rate of seedling growth, etc. The entire life of the study has fallen within an unprecedented period of drouth, and just what the seedlings will do in a year of normal rainfall is yet to be learned.

Work is now under way to correlate the findings on 20 groups of semipermanent plots at different points in the region with the results of this more intensive study.

## Mensuration

### Volume Tables

After spending a full month in Washington, Meyer returned to Portland. There will be a total of twelve tables in the interregional set of Douglas fir volume tables giving volumes in terms of cubic feet as well as board feet for both merchantable and total height and for several site conditions. Apparently detailed site distinctions, after an initial combination into two major groups, are not important in causing variations of volume from the average tabular values. Other unmeasured factors, such as stocking and butt swell, cause much greater variations and are greatly dependent upon locality. The first grouping of sites embraces the better sites usually associated with the coast form in the Pacific Northwest. The second group embraces the poorer sites

associated with the Rocky Mountain form and other interior varieties of the species. In terms of the K-6 site classification, the first contains Sites I, II, and III, and the second Sites IV, V, and VI. In each table the standard deviation of the individual volume estimate runs close to 15 per cent and the deviation for locality from 4 to 6 per cent. Occasionally single areas may be off as much as 15 per cent due to factors not related to site.

## Section of Forest Products

### Logs, Lumber and Other Timber Products Census

Johnson spent the greater portion of the month editing Bureau of Census schedules. As stated last month, 2171 first requests were sent out. To date 1106 replies have been received. Practically all schedules have been edited and many were found more or less incomplete, necessitating the writing of numerous letters for further information. Second requests have been sent out to 663 companies in Washington.

### Ponderosa Pine Mill Studies

Rapraeger has completed a manuscript on ponderosa pine mill scale studies. The data for this report included over 5,000 logs from the Shevlin-Hixon and Mt. Emily investigations.

### Forest Insurance

Shepard made a trip (at the 1-cent-a-mile rate) to San Francisco, February 22 to 25, inclusive, for a conference with the engineers and rating experts of the National Board of Fire Underwriters and the Board of Fire Underwriters of the Pacific.

This conference was extremely worth while from the viewpoint of the forest insurance study. Those present beside Shepard were R. E. Andrews, Assistant Chief Engineer of the National Board; A. W. Gunnison, Superintendent of Schedules; L. S. Bush, Chief Engineer of the Pacific Board, and John Curry, one of the fire studies staff of the California Forest Experiment Station.

Advantage was taken of the opportunities presented by being in San Francisco to increase the scope of basic knowledge with respect to forest fire insurance and protection and to sow a few seeds of publicity in appropriate spots.

Routine progress of the study during February consisted mainly of attention to the valuation phase and resulted in a preliminary draft of the chapter in the final report which will deal with this subject. It

is believed that no more than minor improvements will be required to put this draft into final shape.

Selective Logging in Douglas Fir

B. P. Kirkland from the Washington Office has been in Seattle with Brandstrom the entire month, and together they have practically completed the three principal parts of their report resulting from Brandstrom's field studies of logging methods and costs last season.

Forest Survey

The instructions for the compilation of type areas and timber volumes on lands other than national forests were revised and are now in practically final form.

The bulk of the compilation of inventory data for the Columbia River Release Unit in Oregon has been completed. The balance of the compilation job on this release unit will have to wait until the snow goes from some of the high country where field work was not completed last fall.

Arrangements have been made whereby the Regional Office of Engineering and the Washington Office will recompute the areas of the west side national forests in the region. Not having accurate area figures for the national forests means that the office work on the inventory phase for the national forests can not be completed until such computations are made.

Tentative figures and instructions for cutting depletion on national forests are being tried out on the Mt. Hood National Forest.

Bolles, assisted by Cummings, a temporary assistant, started mapping in Mason County, and Wakeman, assisted by Veitschegger, a temporary check cruiser, started check cruising in this same country. Additional refinements in the procedure in both check cruising and mapping in place have been added in this county so as to tie in the survey data with the sustained annual yield study of the county being made by Kirkland and Brandstrom.

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SOUTHERN FOREST EXPERIMENT STATION

Forest Survey

General

Cooperation with the Bureau of Chemistry and Soils has enabled the Survey to obtain the services of a soils expert, Robert Wildermuth,

who started field work with the crews in northern Mississippi on February 15. It is hoped that a correlation between soil and forest type and growth can be worked out.

Hardwoods

Two field crews continued work in the Delta during the first week, but incessant rains made it impossible to work efficiently. On the second line, water over waist deep was encountered about six miles east of the levee. Coldwater River (properly named) was out of its banks and even small towns were isolated. Work was therefore discontinued in the bottomlands until later in the spring when the water will have drained off. The floods were entirely the result of local rains and not due to backwater from the Mississippi.

After discontinuing work in the bottomlands, it was decided to cover the Upland Hardwood area of northern Mississippi, comprising about 2,280,000 acres. Located on the loessial or silt loam uplands, this region has a typical upland hardwood association. Although the forest sites and types are different from those found in the Bottomland Hardwoods, it was thought that the Hardwood Field Manual would apply to the Upland Hardwoods with but few changes. The necessary changes were prepared by Lentz and on February 12 three field crews, under the leadership of Lehrbas, Putnam and Cruikshank, respectively, began the survey in the uplands.

This Upland Hardwood region is the region of most serious erosion in the South and the Survey crews are taking notes on the occurrence of each type of erosion. Nearly every sample plot to date, except those in the river bottoms, shows evidence of one or another form of erosion. It is thought that the data will prove that the extent of erosion is independent of nearness to roads and that the cropmeter erosion surveys made by Lentz, Sinclair and Meginnis in 1930 gave a fair picture of conditions except that sheet erosion could not be readily recognized from the auto. None of the line tallies have been worked up as yet, but indications are that less than 10 per cent of the region is forested. Idle and abandoned land (due to erosion) will probably account for 30 to 40 per cent of the area. The forest areas have been heavily culled of their merchantable timber. On the upland sites, southern red oak, post oak, cherrybark oak, black gum, hickory and flowering dogwood perdominate, whereas in the river bottoms cherrybark oak, water oak, cypress, red gum, cow oak, tulip poplar, beech, sycamore, river birch, elm and ironwood are the principal species. These bottoms have an entirely different aspect than the main bottoms of the Mississippi Delta, where tulip poplar, beech and river birch are exceedingly rare.

The rains which drove the crews out of the Delta also made wet going in the uplands and considerably delayed the work. As a result

of one night's rain the Tallahatchie River rose three feet over-night (12 hours) and the Coldwater River acted about the same. Due to the rapid run-off from eroded areas and the frequent occurrence of drainage canals, the rainfall is rapidly carried to the rivers and causes local floods of short duration. Some of the deeper canals have been crossed on trees felled across them and, where not too wide, some of the rivers have been crossed in a similar manner. In spite of those measures the crews have had to do considerable wading in order to carry their lines through the river bottoms, and working in cold water knee and waist deep in February is not too pleasant.

Pines

Lentz has revised his preliminary plan for the Survey in the pine region, originally prepared last September and used during the Pearl River County survey, and after approval from Washington it will be mimeographed. Some details have been omitted pending the completion of the analysis of the data by Davis in the Washington office.

Cooperation with the Financial Aspects staff has been arranged and Lehrbas, of the Survey, will run two lines through Alcorn County - the data to be used by both the Survey and the Financial Aspects staff.

Hardwood Growth and Yield

Bull and Lauria visited south-central Louisiana, scouting for growth and yield plots in second-growth red gum. Red gum is a less common old-field species than water oak (Quercus nigra) in this region and the old-field stands are almost without exception very irregular and full of openings, due to frequent and uncontrolled fires and cutting.

Ocular Estimate v. Volume Table

As one phase of current sample plot work, a test was made to determine the accuracy with which field men can estimate the volumes of standing trees. Each man estimated the merchantable height, and the top diameter inside bark of each merchantable log, of each tree on three one-half acre sample plots in an 80-year-old, old-field stand of red gum in the Delta region of northern Louisiana. Four men were engaged in this work and four separate sets of data obtained. Volumes of individual logs were determined by use of the Scribner Decimal C Log Rule. The sum of the log volumes of each tree equalled the merchantable volume for the tree.

Check volumes for each tree were obtained by means of the appropriate volume tables, based on d.b.h. and log length, constructed by the Hardwood

Survey. Volume table volumes were interpolated to inch classes of diameter breast-high and the nearest two feet of height. Every tree was calipered and each estimator used the same calipered d.b.h., but merchantable heights were estimated independently by each man. A summary of the test is as follows:

| | Plot | Total Plot Volume by Estimate | No. of Merchantable Trees | Total Plot Volume by Volume Table | Difference between Estimate and Volume Table | |
|---|---|---|---|---|---|---|
| | | 10's of bd. ft. | | 10's of bd. ft. | 10's of bd. ft. | % of Volume table Value |
| Estimator 1 | 1 | 1,185 | 45 | 1,115 | +70 | 6.3 |
| " 2 | " | 1,207 | " | 1,134 | +73 | 6.4 |
| " 3 | " | 1,199 | " | 1,109 | +90 | 8.1 |
| " 4 | " | 1,221 | " | 1,113 | +108 | 9.7 |
| Estimator 1 | 2 | 903 | 29 | 945 | - 42 | 4.4 |
| " 2 | " | 988 | " | 955 | + 33 | 3.5 |
| " 3 | " | 975 | " | 933 | + 42 | 4.5 |
| " 4 | " | 937 | " | 933 | + 4 | 0.43 |
| Estimator 1 | 3 | 1,011 | 40 | 1,020 | - 9 | 0.88 |
| Estimator 2 | " | 1,038 | " | 1,031 | + 7 | 0.68 |
| " 3 | " | 1,064 | " | 1,019 | + 45 | 4.4 |
| " 4 | " | 1,036 | " | 1,038 | - 2 | 0.19 |

The table indicates that with a moderate amount of training, field men can estimate with considerable accuracy the merchantable contents of standing trees. The consistent improvement in accuracy of estimate from plot one to plot three is significant. Where any sample plot contains but a few merchantable trees, the board-foot volume of these trees can probably be estimated more accurately than it can be determined by use of the volume table.

## New Public Domain

The gross area now reverted to the state in Florida is estimated at approximately 10,000,000 acres, or 30 per cent of the total assessed area of the state. The bulk of this large acreage, which has resulted from the 1925-26 real estate "boom", is in south Florida and is caused by two dominant factors. The first is the sale of worthless land to northern buyers who have paid no taxes on it since purchase, and the second, the floating of large bond issues based on the highly inflated realty values of "boom" days, and the subsequent high taxation necessary to provide revenue for retiring and refunding these issues. The taxes are levied on present deflated values.

The situation in Texas is rendered complex by the fact that, in spite of a fairly large area of delinquent land, the state does not actually enter into possession of the land following delinquency, but merely allows the taxes to accumulate unpaid as a lien against the property, thereby decreasing its sale value. Texas has no policy for the handling of tax-delinquency.

## Erosion

Meginnis and Olsen, at Holly Springs, Mississippi, gathered run-off and rainfall data and built various types of dams and broke down gully banks in preparation for the coming planting season. Numerous heavy rains have resulted in a generous accumulation of rainfall and run-off data. Records from 39 storms have been obtained to date.

Many pictures of the effects of the recent Tallahatchie River floods were taken. This winter the extremely heavy rains have caused an unusually great movement of sands and heavy materials, with the result that there has been excessive damage from deposition on cultivated bottomlands.

## Ecology

### Root System of Longleaf Pine

Heyward prepared an article entitled "Notes on the Root System of Longleaf Pine on the Deep Sands of Western Florida", based on a total of 17 trees excavated on three sites on the Choctawhatchee National Forest. One tree was mature and the remainder were under 3 feet in height. The three sites were: (1) an old field abandoned 12 years ago, (2) an area supporting a stand of longleaf pine and turkey oak judged to be typical of the Choctawhatchee region, and (3) a poorly-drained area adjacent to a swamp. Field work consisted of digging a trench about 2-1/2 feet wide alongside each tree with the depth and length of the trench sufficient to expose a vertical view of the root system. Vertical and lateral roots were exposed by carefully digging with a set of dull pointed sticks of several sizes roughly fashioned after a chisel.

The root system of a typical seedling was found to consist of three well-defined elements: (1) a prominent taproot, (2) an extensive system of horizontal roots, and (3) a set of vertical roots distinct from the taproot.

Seedlings between 3 and 30 inches in height on well-drained soils are characterized by taproots 3 to 9 feet in length with a typical development of 5 to 6 feet. Those on poorly-drained soils have taproots

the lengths of which are limited by the depth of the water table. The average length of the taproots of 3 seedlings on a soil in which the water table was 28 inches beneath the surface at the time of observation was 25 inches.

The lateral roots of seedlings from the longleaf pine-turkey oak type were longer than those of seedlings from the old field. This was attributed to conditions of more intense root competition in the former type caused by the presence of the turkey oak.

The total number of lateral roots on 15 of the 17 trees examined was between 9 and 13.

Over 90 per cent of all the lateral roots excavated occurred within a foot of the surface of the soil.

The taproot of a mature longleaf pine on a deep sandy soil was 14 feet, 2 inches long. This root had the same diameter, 17 inches, 5-1/2 feet beneath the surface of the soil that it had 4-1/2 feet above.

One lateral root was excavated. This root was 75 feet in length and was 6 inches in diameter at a distance of 2 feet from the taproot. Throughout its entire horizontal elongation the root remained within 10 inches of the surface. At a straight line distance of 51 feet from the taproot, this root turned abruptly downward and ended at a depth of 3-1/2 feet beneath the surface.

## Terminal Buds and Needles of Longleaf Pine

Pessin compiled measurements, based on observations during the last field season in south Mississippi, of the length and growth of terminal buds and needles of longleaf pine bearing (1) staminate flowers and (2) pistillate flowers. He finds that the production of staminate flowers apparently retards the growth of both the terminal buds and the needles. Eighteen terminal buds associated with female flowers averaged 69.0 mm. growth from April 8 to September 11, whereas 89 buds with male flowers averaged 37.5 mm. growth in the same period. The needles of the branchlets with female flowers averaged 318 mm. in growth from April 8 to September 11, whereas those associated with male flowers averaged 283 mm.

Next season's observations should show whether the female cones during the year after fertilization will have any effect on the growth of the shoots above them.

## Forestation

A test was made of the shortleaf pine seed that is to be used in the nursery at Russellville, Arkansas, by Region 7. In addition to the standard sand flat, in an attempt to improve on mats used last year,

mats or cakes of acid peat, grooved on the top to hold the seed, were used. Results to date indicate that mats give better germination than the sand flats, take less time, use much less space, cost less and simplify both the administration of the test (counting, watering, etc.) and the cutting tests at the end of the run. The peat substratum, in a covered glass dish, offers less "foothold" to mold than any other "chamber" medium ever tried at the Southern Station.

Management

Interesting information was obtained from photographs taken in the South Pasture Longleaf Pine Tract at Bogalusa from two stations, at which photographs were previously taken in 1921, 1925 and 1927. The stand had been logged in 1920. Residual "seed trees" from the original virgin longleaf stand, shown in the 1921 pictures, have in no case enlarged their crowns perceptibly during the 11 years since logging, and in many cases have lost parts of their crowns, despite the usual assumption that even relatively poor trees so left will "build up their crowns" and become good seed-producers. As a matter of fact, only a negligible amount of seed has been produced by these residual trees at Bogalusa, despite the occurrence of three good seed years since logging.

Demmon and Wahlenberg attended a conference at McNeill to discuss future research on combined forestry and grazing, at which Messrs. Sheets and Greene of the Bureau of Animal Industry, and Mr. Perkins, Director of the Mississippi Agricultural Experiment Station, were present. Plans were proposed for some expansion of the McNeill cattle-raising experiment. Mr. Crosby, a large landowner in the vicinity, has tentatively agreed to lease 5,000 acres of cut-over longleaf land for a ranch demonstration to be operated by the Bureau of Animal Industry with state cooperation. The Forest Service will cooperate to the extent that field conditions and funds permit.

Financial Aspects of Private Forestry

Bond, Wackerman and Reynolds spent most of the month compiling data from Union Parish, Louisiana and Polk County, Texas. A detailed outline for all county reports was completed and the Appling County, Georgia report was revised and is now in final form ready for publication.

Spillers and Evans collected data in Lee County, Alabama during the latter half of the month, for the purpose of supplementing the data obtained in 1929. Lee County was one of the first counties studied in the Financial Aspects project.

The average stocking of the forested area of Polk County, Texas was found to be 16 per cent of normal, according to the Yield Tables for

second-growth southern pines. The average stocking of the farm woodlands alone was found to be less than the average stocking of all forested lands in the county.

Pathology. (Bureau of Plant Industry)

Forest Products Pathology

Chapman prepared a paper for submission to Industrial and Engineering Chemistry, summarizing the results of all small-scale stain control tests to date.

Completion of two commercial log treatment tests at Ferriday and Oakdale, Louisiana showed that best results were obtained with two chlorinated phenols, ethyl mercury chlorida and Cooper's end-coating. An appreciable amount of insect damage occurred in several instances on both treated and untreated logs. A preliminary test, completed on bolts at Bogalusa, Louisiana, gave information on the effectiveness of several new organic sulphur compounds. Here also best results were obtained with the organic mercury compounds and chlorinated phenols.

Preliminary small-scale lumber dipping tests were established at Oakdale, Louisiana on pine, gum and magnolia. In these tests a number of new compounds were used, three of which were submittedby the American Cyanamid Company, six by the duPont Company and one by the Dow Chemical Company. A number of non-proprietary compounds were also tested.

Additional circulars covering certain phases of the application and limitations of the dipping treatments were prepared for distribution by APPECO and the Southern Pine Association.

Forest Pathology

Siggers worked up the January, 1932 estimates on the amount of dead, brown-spotted needle tissue on sample plots established near Bogalusa, Louisiana, for the purpose of determining the effect of ground cover on the brown-spot needle blight of longleaf pine. The average amount of dead needle tissue on four mulched plots was 48 per cent as compared with an average of 37 per cent on untreated plots where the ground cover was left untouched.

Arrangements were made for planting nine bushels of Asiatic chestnut seeds at the Louisiana State Nursery near Woodworth, Louisiana.

The problem of identifying an unknown fungus which causes a basal decay in shortleaf pine in Arkansas very similar to the rot caused by Polyporus schweinitzii was turned over to Dr. Delbert Schwartz, Assistant Professor of Botany, University of Arkansas, Fayetteville, Arkansas.

## RESEARCH ACTIVITIES IN REGION 2

The most important event of the month was the annual Regional Investigative Committee meeting which was held in Denver on February 23 and 24. Although it may seem paradoxical to so state, in view of the fact that the closing of the Fremont Field Station and the cessation of experiment station activities after June 30 on account of suspended appropriations was announced, this meeting in some respects was the most successful in the history of the Station. Education institutions were better represented than at previous meetings. Twelve representatives from four schools, the Universities of Wyoming and Colorado, Colorado Agricultural College and Colorado College, including President Crane of the first named, were in attendance. The interest thus expressed in federal forest research work is significant from the standpoint of the future rehibilitation of the work within the Rocky Mountain region.

The erosion problem was discussed in considerable detail following Supervisor Higgins' review of his extensive reconnaissance of the Colorado River watershed during the past field season to study the erosion situation. Emphasis was placed upon the urgency of undertaking intensive investigations to study methods of controlling aggravated erosion in order to safeguard the Government's investment in the Boulder Dam.

Professors Wagar and Longyear discussed forest research activities at Colorado College and Colorado Agricultural College respectively, the latter giving particular attention to the Forest Service-Agricultural College cooperative experiment initiated twenty years ago to determine the possibilities of the preservative treatment of fence posts. A final report on this project will most likely be made at an early date.

Dr. Beath of the University of Wyoming, in discussing palatability differences in poisonous plants, stated that the lack of some element in the diet of grazing animals is probably the principal factor in attracting livestock to poisonous plants in the presence of ample forage, and that future research in the diet of such animals will greatly assist to reduce the losses occasioned through the consumption of poisonous plants.

Following the adjournment of the Investigative Committee meeting, the Regional Camera Point Committee went into session to pass upon the permanent camera points which were proposed for establishment by the various Forests. Supervisor Keithley and Messrs. Cochran, Douglas, and Roeser, of the Regional Office, constituted this year's committee.

In the Colorado Springs office the first ten days of the month were employed by the technical personnel, consisting of Roeser, Averill and Lepley, in compiling the results of experimental sample plot measurements in the Engelmann spruce type on the Rio Grande Forest. An eighteen

year record for the four plots located in Willow Park is now available. The results for Block A, consisting of three plots on a good quality II site, are briefly summarized.

| Plot 1 Degree of Cutting | | Light | Plot 2 Moderate | Plot 3 Heavy |
|---|---|---|---|---|
| Original stand | cu. ft. | 7,586 | 8,850 | 6,687 |
| | bd. ft. | 30,883 | 38,646 | 26,704 |
| Volume left in 1914 | cu. ft. | 5,182 | 4,020 | 2,810 |
| | bd. ft. | 19,762 | 15,924 | 10,388 |
| Percentage of cubic foot volume left | | 68 | 45 | 42 |
| Basal area left (sq. ft.) in 1914 | | 180 | 134 | 104 |
| Volume in 1931 | cu. ft. | 6,276 | 5,095 | 3,275 |
| | bd. ft. | 24,622 | 20,434 | 12,242 |
| Net cubic foot increment per acre-annum | | 60.8 | 59.7 | 25.8 |
| Approx. gross cubic foot increment per acre-annum | | 101.6 | 68.9 | 69.9 |
| Net board foot increment per acre-annum | | 270 | 251 | 103 |
| Per cent net board foot increment per acre-annum | | 1.4 | 1.6 | 1.0 |

The lightly cut plot has maintained a highly satisfactory rate of growth when compared with the plot upon which an approximate 50% cut was made. This condition may be attributed to a very desirable distribution of size and age classes. Losses, as may be expected, were numerous on this plot. This is indicated by the approximate gross cubic foot increment for the entire period of study. The minimum loss was experienced by the moderately cut plot. From a management, as well as silvicultural, standpoint the heavy cutting is not feasible or desirable. A 40 year return is possible under the conditions depicting a light cut. Following a second cut and the elimination of most of the mature trees, it is anticipated that the cutting cycle will be reduced to approximately 25 years. Under a condition of moderate cutting, a return in 90 years is indicated under present conditions, with a possible reduction to 60 years when silvicultural conditions are improved following a second cut. All in all, the date indicate that on the sites represented by these plots, it is not advisable to reduce the growing stock much below 150 square feet, unless there exists an excessively abundant representation of the mature and decadent age classes.

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## MANUSCRIPTS

### LAKE STATES

Aspen Competition in Norway Pine Plantations. F. H. Eyre, (For Jour. of For.)

### REGION 2

Following prepared by Jacob Roeser, Jr., and submitted to Regional Forester:

Growth in the Engelmann Spruce Type in Central Colorado on Granitic Formations.

Growth in the Engelmann Spruce Type in Northern Colorado.

Growth in the Engelmann Spruce Type in Central Colorado on Sedimentary Formations.

Growth in Sapling Lodgepole Pine Stands in Northwestern Wyoming.

### PACIFIC NORTHWEST

Some Problems Encountered by the Forest Survey in the Douglas Fir Region. H. J. Andrews (For Forest Club Annual, O.S.C.)

Instructions for the Compilation of Type Areas and Timber Volumes for Lands Other than National Forests. By the Survey Staff.

Sawmill Waste and Its Utilization in Scandanavia and the Pacific Northwest. By J. E. Lodewick (For Jour. of For.)

The Relation of Ponderosa Pine Log Size and Quality to Lumber Grades and Conversion Values. By E. F. Rapraeger.

## IN PRINT

| | |
|---|---|
| Burleigh, T. D. (Biological Survey) | Occurrence of the Eastern Savannah Sparrow in West Virginia. (Auk, Jan. 1932) |
| Heyward, F. | Severe damage to slash pine caused by razorback hogs. (Naval Stores Review, Jan. 2, 1932). |
| Westveld, M. | Releasing merchantable-sized spruce and fir through girdling. (Jour. For. Jan. 1932). |
| Wyman, L. | The proportion of scrape formed by slash and longleaf pine. (Naval Stores Review, Jan.9-16, 1932). |